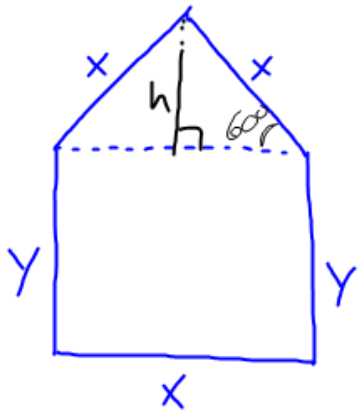
Window Pain

A special window has the shape of a rectangle surmounted by an equilateral triangle. If the perimeter of the window is 16 feet, what dimensions will admit the most light (maximize the area)?



$16 = 3x + 2y \qquad y = \frac{16 - 3x}{2}$

$A = x \cdot y + \frac{1}{2} x h$

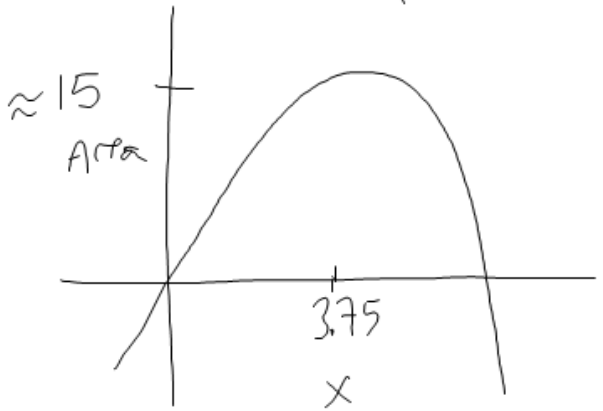
$A = x\left(8 - \frac{3}{2}x\right) + \frac{1}{2} x \left(\frac{\sqrt{3}}{2}x\right)$

$\frac{1}{2}b \cdot h$

$\sin 60° = \frac{h}{x}$

$h = x \sin 60°$

$h = \frac{\sqrt{3}}{2} \cdot x$



(39)

vertex $(-2, 5)$ pt. $(0, 9)$

$$y = a(x-h)^2 + k$$

$$y = a(x+2)^2 + 5 \longrightarrow y = (x+2)^2 + 5$$

$$9 = a(0+2)^2 + 5$$

$$9 = a(4) + 5$$

$$\boxed{a = 1}$$

(31)

$-2x^2+16x-31=0$

$x^2-8x+\frac{31}{2}=0$ divided by -2

$x^2-8x=-\frac{31}{2}$

$\left(\frac{1}{2}b\right)^2=(-4)^2=16$

$x^2-8x+16=-\frac{31}{2}+16$

$(x-4)^2=\frac{1}{2}$

Solve for x

$x-4=\pm\sqrt{\frac{1}{2}}$

$x-4=\pm\frac{1}{\sqrt{2}}$

$x=\pm\frac{\sqrt{2}}{2}+4$

vertex

$(x-4)^2-\frac{1}{2}=0$

$-2(x-4)^2+1=0$

vertex

$(4,1)$

Expand (foil)

$(2x+3)(3x-2)$

$6x^2 - 4x + 9x - 6 = 6x^2 + 5x - 6$

Factor

add, mult.

$x^2 + 7x - 30 \longrightarrow (x+10)(x-3)$

$3x^2 + 31x + 36 \longrightarrow (3x+4)(1x+9)$

$1 \cdot 3$

$1 \cdot 36$
$2 \cdot 18$
$3 \cdot 12$
$4 \cdot 9$
$6 \cdot 6$

HW

Quadratic Review

#1, 2, 3, 7, 8, 9